

**INSTRUCTIONS
FOR OPERATING**

U. S. NAVY

GUN SIGHT AIMING POINT CAMERA,

(GSAP) TYPES N-4A and M-4A

Instructions for Operating

U. S. Navy Gun Sight Aiming Point

16mm. Camera, Types N-4A and M-4A

It is advisable that the camera be mounted in place before connections or adjustments are made. Four mounting studs are provided, protruding approximately $\frac{1}{16}$ inch from the back of the camera.

POWER

The Bell & Howell GSAP Camera is driven by an electric motor. A thermostat automatically cuts out the motor if improper threading of the film magazine, or any other factor, should cause the film to jam, thus eliminating fire hazard, burnt-out motor, etc. To connect the camera for operation, insert the line-cable plug into the 4-pin male receptacle A, Figure 1.

LOADING

THE CAMERA

The GSAP Camera uses film which is pre-threaded in metal magazines. To load the camera, lift the spring latch B, Figure 1. Insert the film magazine as shown in Figure 2, making certain that (1) the opening in the film magazine goes in first; (2) the pin on the edge of the magazine faces away from the line-cable receptacle; and, (3) the footage dial on the magazine (which is not used in this camera) is toward the outer face of the camera and not toward the interior. Push the magazine forward until there is an audible click; then close the door.

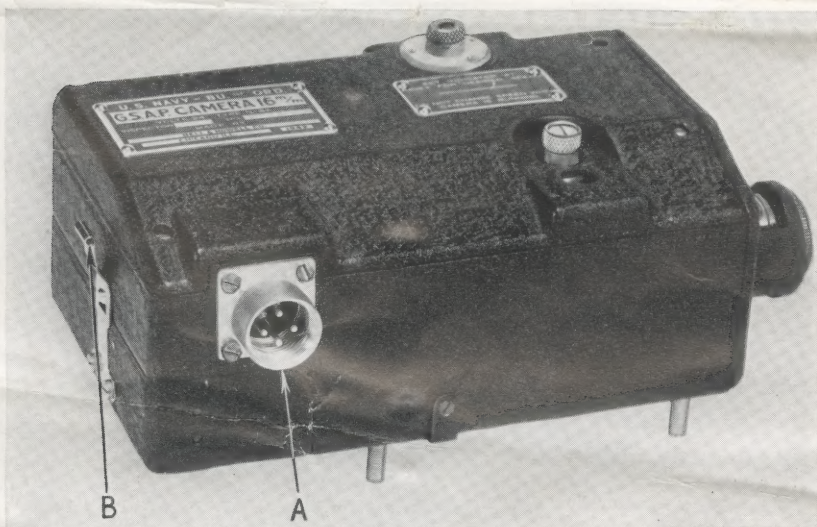


Figure 1

SPEED CONTROL

This camera operates at any one of 3 speeds—16, 32, or 64 frames (or pictures) per second. The motor operates at a constant speed, and the various camera speeds are achieved by changing the gear ratios. To set the camera speed, turn the speed control knob C, Figure 3, until the index mark for the desired speed figure on the dial is opposite the fixed index mark on the camera.

IMPORTANT: *Do not change speed while the camera is in operation.*

FOOTAGE INDICATOR

The footage dial on the GSAP Camera is external; the dial on the magazine is not used. When the loaded camera is ready for operation, turn the indicator knob D, Figure 3, until the footage dial E, just below, indicates 0, if a full magazine is to be used. If the film magazine is not full, set the indicator to correspond with the figure on the magazine footage-indicator dial. Henceforth during that film run, the dial will indicate the amount of film *still remaining unexposed*.

THE LENS

Method of Mounting. The lens F, Figure 3, is permanently mounted within the heavy, protective, sheath-and-flange unit G, Figure 3. The lens is mounted on the camera by fitting the flange over the three dowel studs H, Figure 3. When changing lenses, be sure that the flange is flush with the camera housing before tightening the nuts on the dowel studs.

Adjusting the Lens. The lens is $1\frac{3}{8}$ inches (35mm.) in focal length with a maximum aperture, of F 3.5. Two lens adjustments are necessary, one for the

camera speed—16, 32, or 64 frames per second, and one for light conditions—B (bright), H (hazy), D (dull), or F 3.5 (for adverse light conditions).

These adjustments are effected with three collars on the lens, J, K, and L, Figure 4. Collar J is fixed, and bears a single index mark, M, Figure 4. Collar K rotates and bears the camera speed index figures (16, 32, 64) on its forward edge, N, Figure 4, and the exposure index symbols, B, H, D, and F 3.5, on its rear edge, R, Figure 4. Collar L also rotates, bearing a single index mark, P, Figure 4.

To set the lens for camera operation at 16 frames per second under dull lighting conditions, for example (as shown in Figure 4), rotate Collar K until the index mark for 16 (N) is opposite the index mark (M) on the stationary collar J. Then rotate collar L until its index mark (P) is opposite the index mark for the symbol D (dull) on collar K.

A wide variety of combinations is possible, with the figures 16, 32, or 64 placed opposite the index mark M, and with the index mark P set for bright, hazy, dull or wide open at F 3.5, as the light demands. Figure 5 illustrates the correct lens adjustment for filming at 32 speed on a bright day, and Figure 6 shows how the lens should be set when the camera operates at 64 speed on a hazy day.

IMPORTANT: *Never attempt to dismantle the lens.*

THE FILTER

The amber filter, Q, Figure 4, which is screwed into the front of the lens, should not be removed except for cleaning. It should be left in position at all other times, for the lens adjustments are calibrated to compensate for the increased exposure required when a fil-

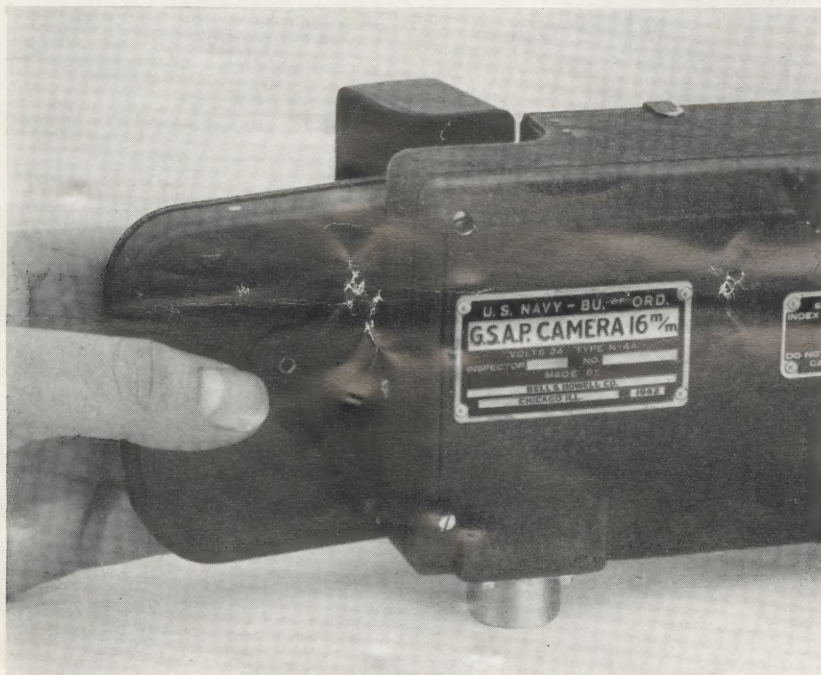


Figure 2

ter is used. The filter should be cleaned, when necessary, with lens-cleaning tissue. Do not allow finger marks or dust to remain on the filter, as light transmission would be impaired.

HEATING UNITS

To prevent freezing at high altitudes, the camera is equipped with a thermostatic heater, which, down to a minimum of 40° F. below zero, automatically maintains the interior of the camera at a temperature between 35° F. and 95° F. The heater starts operating when the temperature drops below 35° F. and is cut out if the internal temperature rises to 95° F.

If an external, lens-heating unit is to

be used, to prevent the glass surfaces from becoming frost covered in extreme cold, the heater cord should be plugged into the pin-jacks S, Figure 3, which are provided for this purpose.

FIDUCIAL MARKS

No reticule pattern has been incorporated in the optical system of the Gun Sight Aiming Point Camera. However, fiducial marks have been placed at the center of each side of the film aperture and they will appear in each frame of the exposed film. Aligning these marks horizontally and vertically will indicate the center of the exposed frame. It will be observed that the crosslines of the boresight align themselves with the fiducial marks in the film aperture.

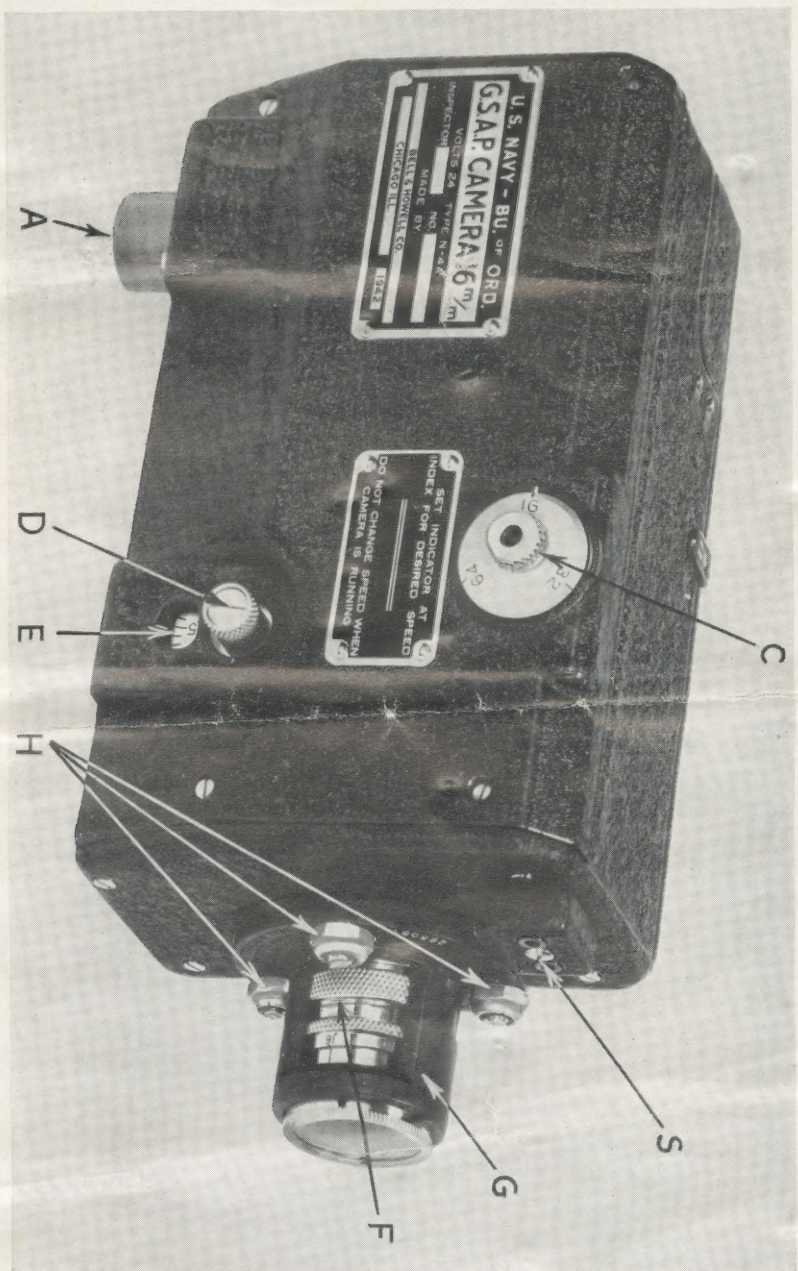


Figure 3

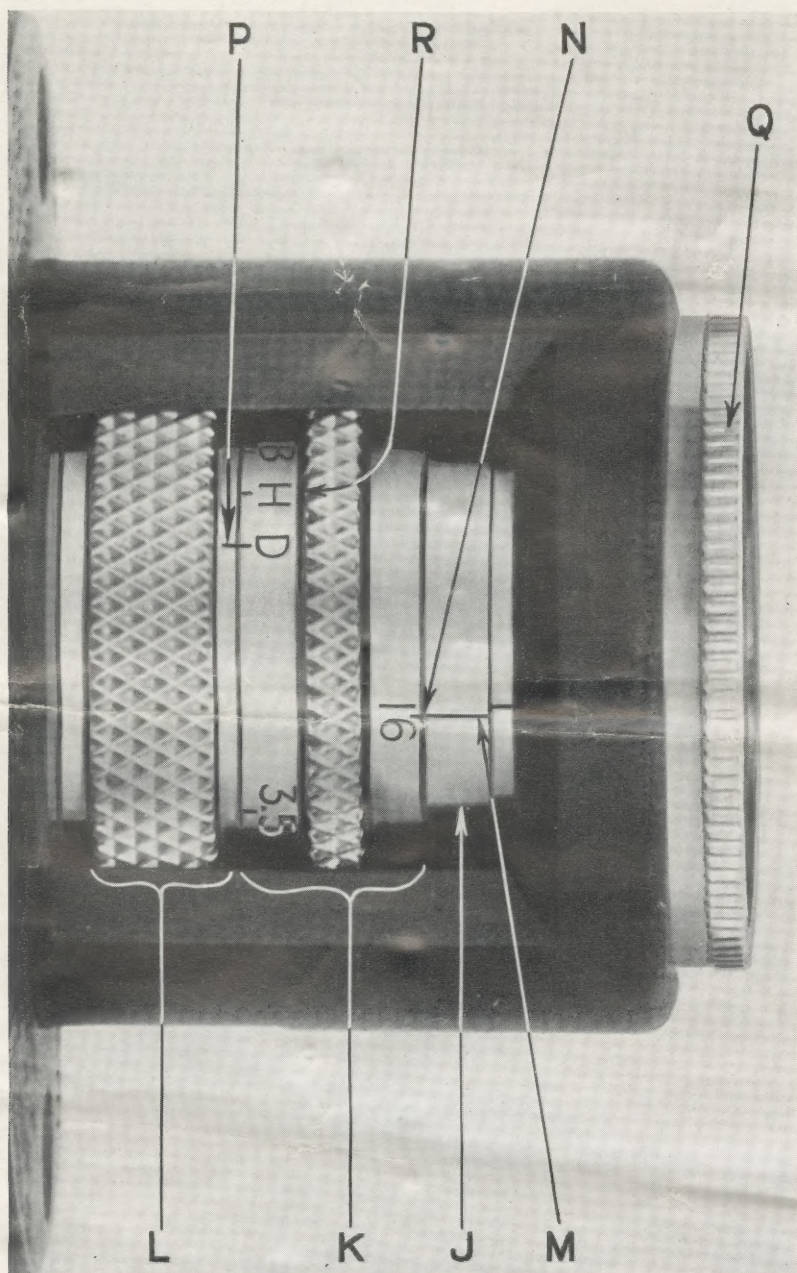


Figure 4

BORESIGHT

The boresight for the Gun Sight Aiming Point Camera is designed so that it may be inserted into the space ordinarily occupied by the film magazine. The eyepiece of the optical system is capable of rotation through 360° and may be used in any position. The cross wires are adjusted in manufacture to indicate accurately the center of the film aperture. If it is found that the boresight cross wires do not coincide with the camera fiducial marks, the camera should be turned in to an overhaul activity for checking and adjustment.

OVER-RUN CONTROL

The Bell & Howell GSAP Camera is designed to start operating simultaneously with the weapon, and, unless the over-run control is used, the camera will stop when firing ceases.

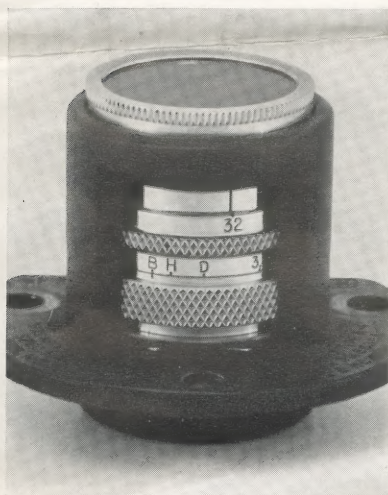


Figure 5

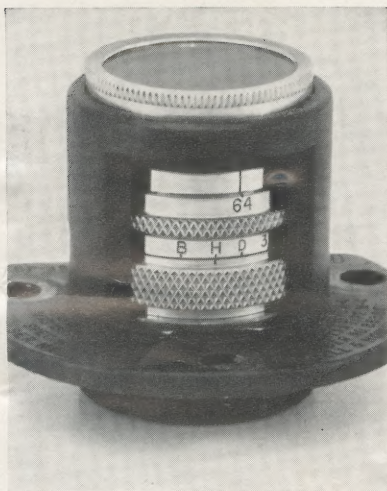


Figure 6

However, provision has been made within the camera for the external application of an over-run control, should such a unit be installed to keep the camera running for a few seconds after firing ceases. If this unit is installed on the camera, film exposed during the over-run may be identified from that exposed during firing, by the image of a retractile pointer which automatically moves into the aperture area, from one corner of the frame, when firing ceases and the over-run begins. This indicator will be visible in each frame exposed during the over-run.

LUBRICATION

The camera is completely lubricated when it leaves the factory, and no further local lubrication of any part is necessary. Lubrication will be checked and renewed when necessary, when the camera is overhauled.



EMBLEM OF EXCELLENCE

BELL & HOWELL COMPANY

1801-15 Larchmont Avenue, Chicago

New York - - - - - 30 Rockefeller Plaza

Hollywood - - - - - 716 N. LaBrea Ave.

Washington, D. C. - - - - - 1221 G Street N. W.

London - - - - - 14 Great Castle

Established 1907